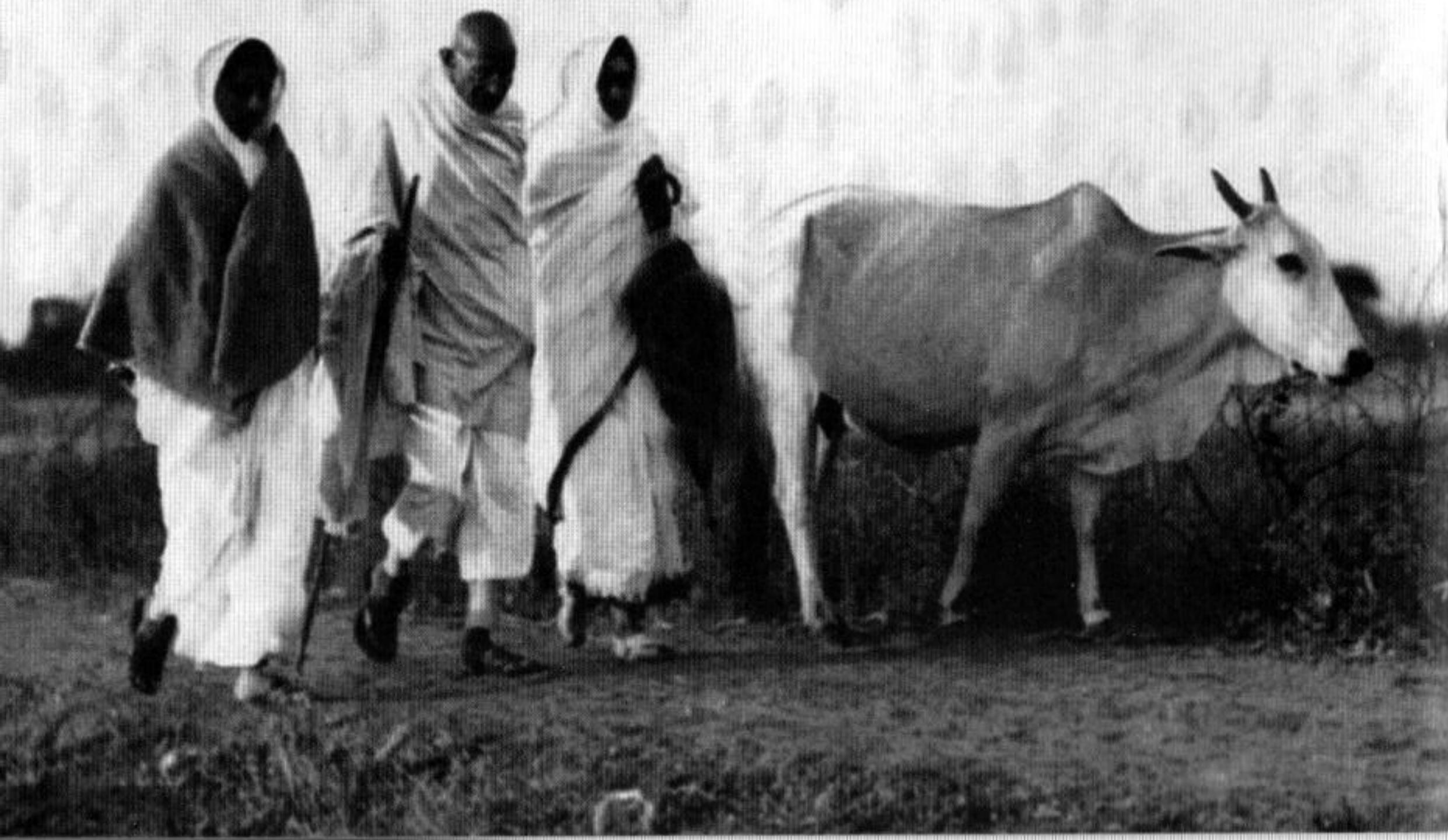


Panai

The bullock is not only a living tractor; it is also a living fertilizer factory and gives us farmyard manure which supplies nitrogen and improves the porosity of the soil, thus helping to increase the moisture content of the soil as well as proper aeration. These three factors are essential to plant growth. 'No amount of concentrated manure would help if the porosity of the soil and consequent aeration of the soil are not improved'.

- THE CASE FOR THE BULLOCK (Valji Govindji Desai)



THE COW IN OUR ECONOMY

J.C. Kumarappa

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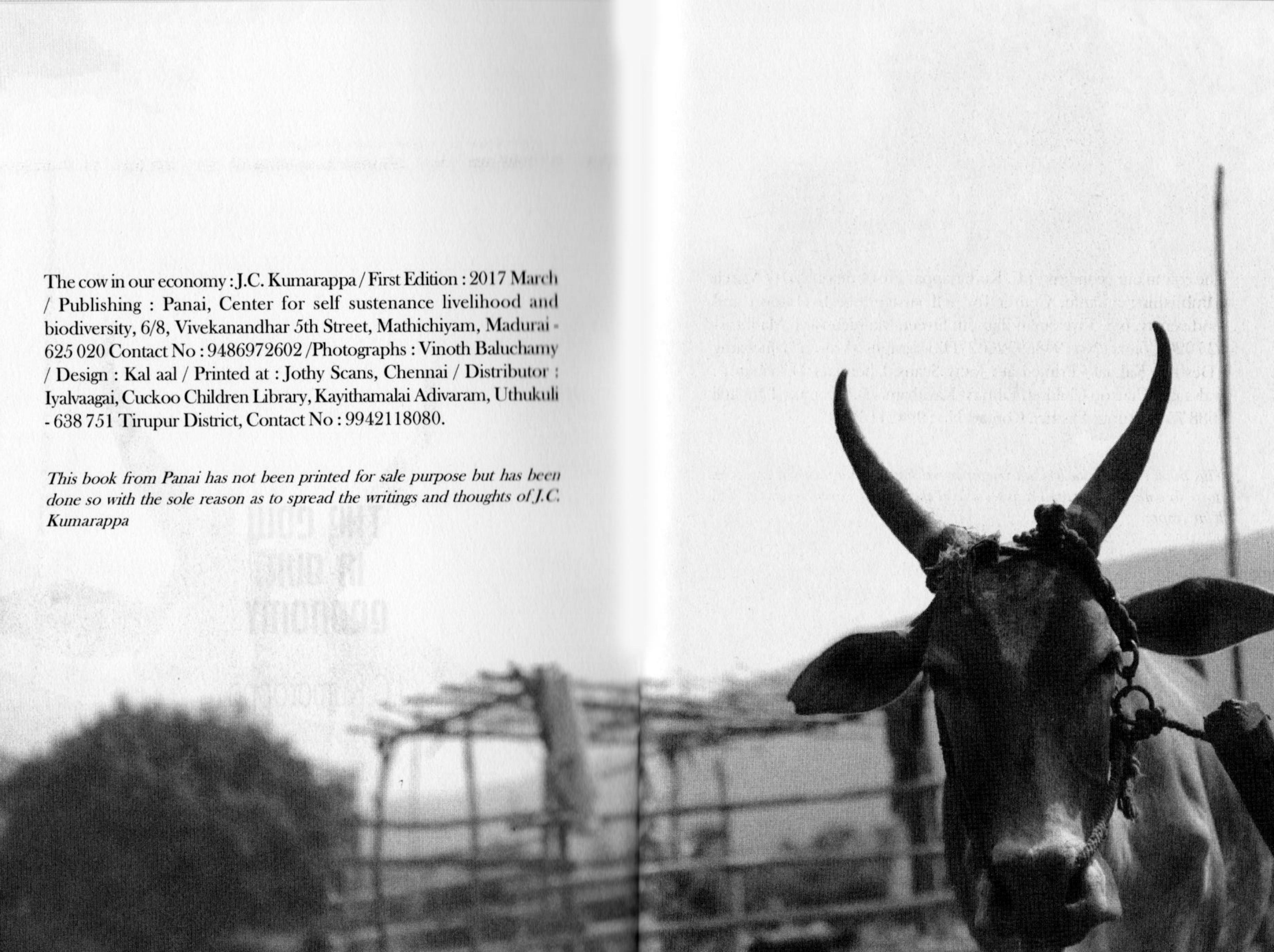
**THE COW
IN OUR
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J.C.Kumarappa

Panai

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done so with the sole reason as to spread the writings and thoughts of J.C.
Kumarappa*





The cow and Peace



Cattle Breeds

Cattle breeding is a science practise of old in India. 150 years back the East India Company was developing sturdy bulls for drawing their gun-carriages. Even now we find in certain Government farms the same old and obsolete policy in vogue. At about the same period Tipu Sultan had developed a fast running breed of bullocks which served him in the Army. Lord Wellesley, who had used these in his army, was so impressed by them that during his battle at Waterloo, he is said to have exclaimed at one time when his tired horses failed to reach the goal, "Alas! had I those Mysore bullocks, they would not have failed me".

All over India we find different breeds of cattle. Many of these have been intentionally and intelligently bred. Now we ought to know the direction in which we are to proceed. There are a few points which may be well kept in view when we want to breed our cattle. Firstly, each locality has got its individual requirements according to the type of work to be done and the climate and other conditions; over and above this, even in the same locality all people will not require the same type of bullocks. A farmer with a small holding, with work for lesser bullock power, would need a smaller bullock which he can maintain on the fodder produced in his small field; whereas a bigger farmer's requirement will be different. Thus we shall have to provide in each locality various types of bullocks - small, medium and big - according to the needs of the agriculturists. A mere dual purpose cow will not do for all time. We should not sacrifice special qualities for greeting an average. Specialization in bullocks is a felt need. For this purpose we may not have at present a sufficient number of stud bull to develop different types of bullocks. If we go on as we do with scrub bulls out stock is bound to deteriorate. It may not be possible to wait till we get adequate numbers of

good bulls. Under the circumstances we may have to resort, for the time being, to what is called artificial insemination. I hesitate to put these suggestions before you. But I have stated the problem for your consideration.

Cow's Status

The cow touches all our economic activities. This had been recognised even in ancient times. That is why sentimental, religious and great importance had been attached to 'the cow'. Why Gandhiji took to the cow was for reasons deeper than this. To him 'cow' symbolized all animal wealth. The service of the cow was to bring him nearer to his goal of truth and non-violence. All this programme sprung from this root.

Man has utilized resources of power other than manual labour for the production of his utility articles. Prior to the discovery of coal, man in the West used horse as the main motive power. Here in the East cow ruled - cow the mother of the bullock and its progeny - the bullock. We find that as the so-called industrial era dawned the economy of the West shifted from the horse to coal and thence to petroleum. This shift meant greater and greater violence. Thus a stress on cow means bringing back mankind to its former mooring.

Causes of War

When we use the cow and cattle wealth as helpers in our production there is a natural limit to the quantity of production in comparison to the state of affairs that ensues when coal or other such resources of power are utilized, on the expenditure of which there can be no natural limit. Thus the self-sufficiency or the measures of it which is attainable in a cow economy is distorted and disturbed when we depart from it. When the quantity of produce increases, markets are to be sought for it. Europe's

hunt for the markets in the last two centuries was motivated by this economic factor; thus as soon as man changed over from animal economy to power economy violence became necessary. They fought with each other for markets. The result was the first World War - when the countries depending upon the coal economy fought with each other for the market areas.

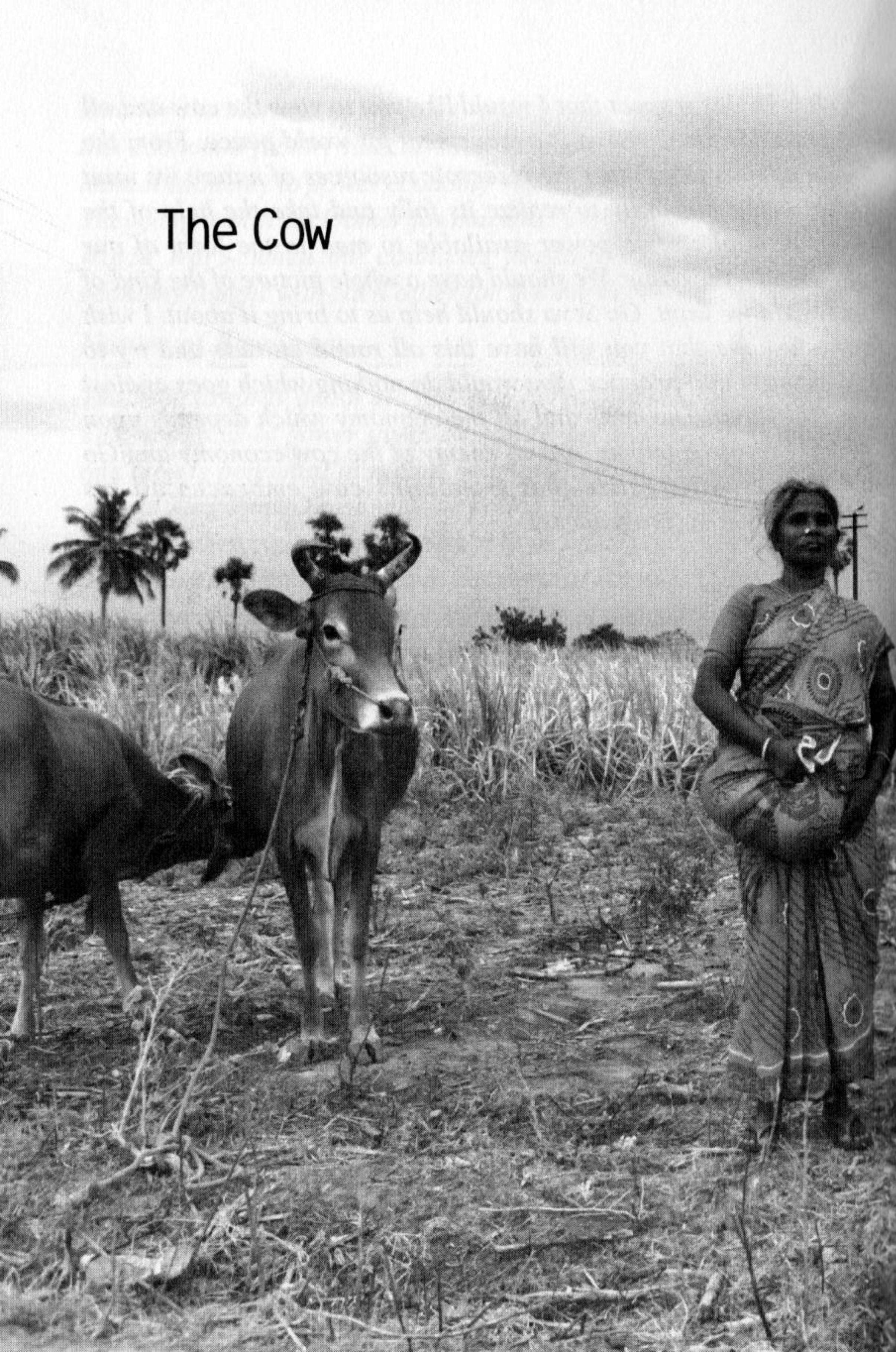
Nature of Resources

The race towards death did not stop here. It continued ahead. The resources of power given by nature are of two categories, one type is perennial in nature belonging to the vegetable and animal kingdoms. These may be called the 'current resources' and the other type is in short supply in nature like coal, iron, petrol and the like belonging to the mineral kingdom. These are not being manufactured under the bowels of the earth and their exhaustion means lessening in the total quantity available. These limited resources may be called the 'reservoir' type. It is when man depends more and more upon the latter type of resources that violence increases. Thus whereas from cow to the coal was one step towards violence, coal to petrol was a leap further towards the abyss. The last conflagration got the whole world under its sway. The Second World War was a natural corollary when exploiting countries fought not only for their markets, but also to control the motive power-producing areas. These petrol pockets distributed over a dozen countries of the world, became the bone of contention over which the whole world fought. If we want to bring about a change towards peace we should depend more and more on the current type of resources for our motive power and 'the cow', which provides the bullocks belonging to that type, stands for it. Hence the cow becomes symbolic of an economy of Peace.

It is in this respect that I would like you to view the cow and all it stands for Go Seva is a movement for world peace. From the mad rush to exhaust the reservoir resources of nature we want to bring humanity to realize its folly and take the help of the perennial motive power available to man in the form of our friends, the cattle. We should have a whole picture of the kind of world we want. Go Seva should help us to bring it about. I wish and hope that you will have this all round attitude and try to bring it into practice. You would do nothing which goes against 'the cow'. The mills and all the economy which depends upon 'reservoir economy' are an enemy of the cow economy and Go Sevaks will realize that Gandhiji's cow embraces all his constructive programmes.

January, 1953. "Gram Udyog Patrika".

The Cow



The Cow Conference, held at Amritsar, in 1946 laid great stress on the place the cow holds in our rural economy. Apart from the programme for the preservation of the cow, as an animal, we have also to consider the steps to be taken to build up the economy symbolised by the cow. We cannot take up isolated items and concentrate on those without consolidating village life on all fronts.

From this broader approach any encouragement given to the cultivation of long staple cotton for mills is tantamount to the destruction of the cow as the seeds of long staple cotton are not available as cattle feed because of the fuzzy short staple cotton being left unlinted on the seed. Owing to this the bullocks are deprived of their oil & protein diet. Our villages are dependent on animals for the satisfactory working of their economy.

The opening of vanaspati 'Ghee' mills again cuts across this economy. It deprives people of a wholesome article of diet- vegetable oil and replaces it by indigestible hydrogenated oils and sets up unfair competition with the 'tellis'.

The building of expensive roads, surfaced with Asphalt, cement etc., while being wholly unnecessary for the village economy, takes away from the cultivator the part-time occupation of transport, and reduces the employment of the bullocks. Such roads encourage draining the villages of their products. They are harmful to the unshod-animals and dislocate the self-sufficient village economy.

It is not necessary to multiply instances. The cow symbolises a way of economic life just as much as the internal combustion engine and the lorry typifies another way of economic life. The choice is before us. We may choose the one or the other but we cannot make a hotchpotch of it. If we decide in favour of the cow we have to take up that economy in all its aspects.

It is imperative that the Provincial Governments, that are now seriously thinking of rural development, should clear the issue and declare for a definite line of action. No haphazard attack on this problem will solve it.

** teli-specific cast people who occupied the pressing of oil*

November, 1946. "Gram Udyog Patrika".

Cow Protection



There is a good deal of talk today about protecting the cow from the slaughter-house. It is good that people are becoming conscious of the great evil that indiscriminate slaughter of cattle has brought to our country. On the purely short sighted view, the need for milk in a vegetarian country being important, it gives a premier place to the cow as a feeder of the nation. Apart from that it also provides the bullock which is the motive power with which the farmer produces from the land. The importance of this aspect of the question has been fully realised in conferring divinity on the cow and raising cow-slaughter to the level of a religious question. However, because of fanaticism, the very same zeal on the one side has created cussedness on the other side and we often find conflict between different sections of the population centred around cow slaughter. Therefore it now becomes necessary to ascertain exactly the place of the cow in India and give it a national approach.

With an artisan the tool that he uses becomes almost an object of worship. In fact, in India we have a definite festival 'Shastra Pooja' devoted to this ceremony. Man recognises his economic dependence on the means of production. Just as an artisan depends on his tools, similarly the farmer depends on the cow and if we extend the economic sphere, we may say the cow, being the means of producing food, becomes the centre of the economic organisation of man, especially in an agricultural country like India.

Apart from this aspect, when we look upon the cow as the producer of the bullock, the importance of the cow is enhanced. She now represents the centre of our economy. We may call our economic organisation, where the cow contributed towards motive power, transport, food production, etc, as a 'Cow-centred economy' in the same manner as England and other European countries were, not long ago, horse centred economies.

During the last century England drifted from being a horse-centred economy into a coal-centred economy and from being a

coal-centred economy she is fast moving into an oil-centred economy. These stages are very important to notice as the fate of the world itself depends on the source from which we obtain our power.

In the cow and the horse-centered economies we have unlimited sources as we could breed as many bullocks and horses as we needed and, therefore, there being no restriction on the amount available, it does not arouse anybody's greed or jealousy; but coal and petrol being limited in their supply and quantity, uses of such sources of power lead to friction amongst nations as the source dries up. It is now well recognised that these global wars are in no small measure due to different nations seeking to get control over oil fields. Hence the coal and oil economies lead to conflict amongst nations. Unlike these two, the cow and horse economies are, comparatively, peaceful economies. Therefore, in a wider sense we may say that when we break through a cow-centered economy we are really causing cow slaughter, i.e. in other words when our actions are inimical to the existence of the cow-centered economy, we are not in the company of the protectors of the cow. For example, when we use coal and oil as our source of motive power we are really banning the cow from our economy. When we are making asphalted roads, which are not in the interests of animal traction, we are also guilty of breaking through the cow-centered organisation. This aspect of the question is much more vital to us than the mere slaughter of the four-legged and two-horned animal.

We wonder how many of our friends who stand up against cow slaughter can show their hands clean of bovine blood from this higher interpretation of cow protection. The 'Cow' like Khadi, is symbolic of a way of life. 'Cow Slaughter,' therefore, would signify making impossible that way of life. We hope that those who stand for cow protection will realise the extensiveness of the cause which they stand for, and will whole-heartedly support this wider application of the principle.

October, 1947 "Gram Udyog Patrika".



TRACTOR CULTIVATION



For about a week I have been here at Pannai Ashram. Ever since I arrived here I have been distressed to hear the buzz of the tractor. I understand that some landlords of Sindi, who own lands at Seldoh, have hired Government tractors to plough their lands. I fear these friends have not considered the consequences of their acts. I have previously pointed out the damage caused by big industries and centralisation. I shall now speak about the tractor in particular.

I hear this tractor is one of 50 horse-power i.e. it is equivalent to 50 pairs of bullocks and the charges are Rs. 60/- per day. This means that every day it works, it takes away about one khandy of jawar and leaves behind smoke. We are already poor, how can we afford to pay such charges ? On the other hand, if we used bullocks we would get rich manure with the urine and dung of these animals. This method would involve keeping cows also to breed bullocks. The cow will yield milk which is a very wholesome form of food. This is our economy. By breaking into it we impoverish ourselves. Besides, as the tractors plough more deeply than the bullocks, unless we have more manure and more water we cannot benefit from them.

These machines such as plough, hoes and harvesters. Mostly these come from the U.S.A. to which place we have to export our raw materials in payment. Export of raw material causes unemployment in our own land. If we send out groundnuts the teli loses his work and the Ghani Industry dies. Thus using tractors involves not only unemployment of bullocks but also causes unemployment of our fellowmen. We cannot slaughter these useless animals and men. Hence, they become a drain on the country.

The money spent on the tractor is not of use all the year round. It serves only during seasons of ploughing, harvesting etc. while

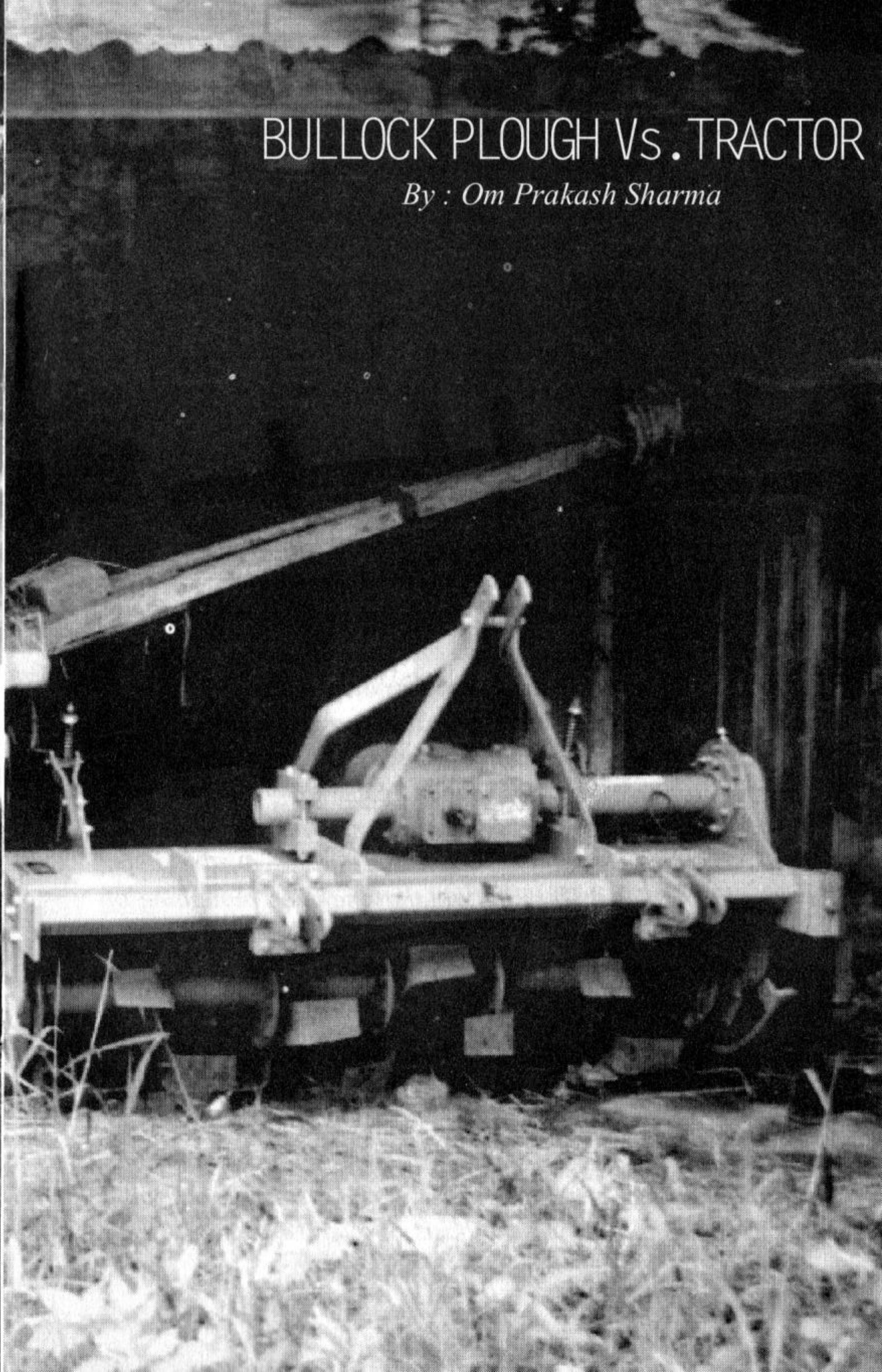
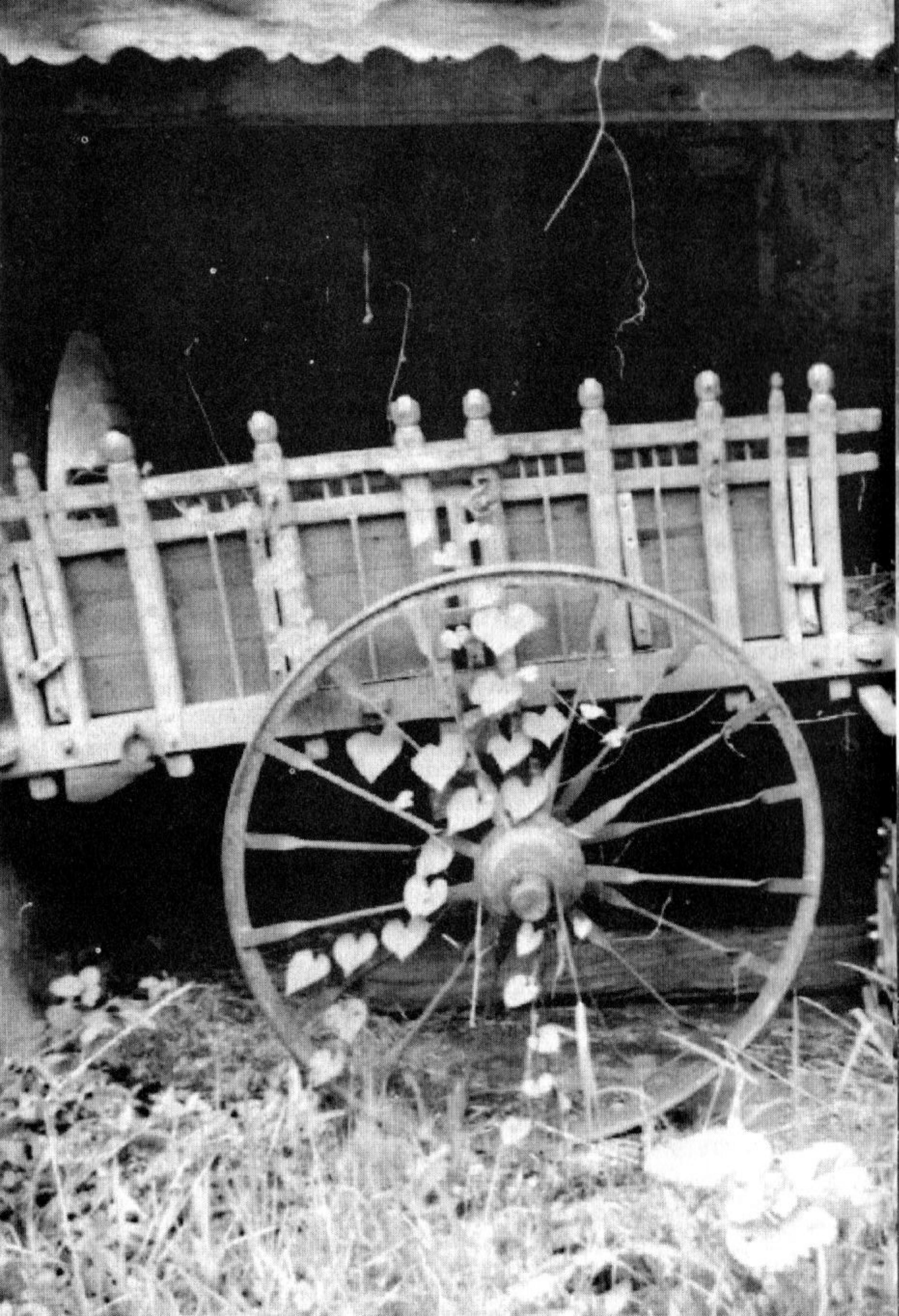
bullocks can be used always for drawing water, transport of goods, people etc. Thus it leads to a huge amount of capital being locked up. When war or other disturbance occurs we cannot get diesel oil, which comes from foreign lands, as this oil will be used mainly as fuel for war machines. At such a time we cannot plough our fields as the bullocks being of no use will have become extinct by then.

Don't be carried away by the fact that part of the charges are paid by the Government. The Government itself has no money of its own, but what it gets from taxing the people. So part of the charges paid by the Government only means that the country bears the burden as a whole. So we are not receiving the service any cheaper, and we, who do not use the tractor, are also made to pay for the services rendered to the rich farmers who are the ones who use the tractors. Thus the burden falls on the poor people, also. If you do not approve of paying for rich people, you should actively oppose the Government using public money for supporting tractor cultivation.

There are many more evils which I have not the time to elaborate, but I have said enough to indicate the dangers underlying the seemingly innocent 'Help' rendered by tractor cultivation. So villagers should be warned against such dangers being imposed on them unawares, and work towards making themselves self-sufficient.

* maunds-37.33kgs / khandy-20 maund / jawar-a variety of sourghum / Ghani-oil press of indigenous type / teli-specific cast people who occupied the pressing of oil / kharif-monsoon / rabi-winter.

May, 1954. "Gram Udyog Patrika"



BULLOCK PLOUGH Vs. TRACTOR

By : Om Prakash Sharma

Cow and the tractor and it has been found that the time honoured implement-the country plough-is still a good tillage implement and in many cases superior to the tractor.

Sri A.R.Khan, the Agronomy Specialist of the Indian Agricultural Research Institute, New Delhi, conducted experiments from 1942 to 1947 with the object of studying the effect of seed-bed preparation with alternative forms of tillage implements on the yield of wheat, by the treatment and comparison of bullock and tractor cultivation on an irrigated piece of land at Karnal sub-station of the Institute.

One of the above plots was ploughed seven inches deep by the tractor implement i.e. by the soil inverting plough followed by the cultivator and the harrow. Another similar plot was ploughed to a depth of four to five inches with the bullock plough called 'Victory' and supplemented with the local country plough. The above experiments were continued for a period of six years with these implements. It was found that with the tractor implements i.e. with plough, cultivator and disc, the average yield of wheat throughout this period was 10.98 maunds per acre, while with the 'Victory' cum country plough the corresponding average yield was 12.65 maunds per acre. In these experiments the manuring and other cultural treatments were the same for all the plots. This experiment clearly brought out that the deep ploughing of the tractor is harmful for wheat cultivation. The tractor cultivation tends to pulverise the soil too much. This encourages its packing after irrigation or a shower of rains. The air moisture relationship is thus disturbed with the result that the crop suffers.

These findings have been confirmed by numerous research investigators. Keen and his co-workers at Rothemstead have demonstrated that there was no advantage in ploughing deeper than four inches. Stameric reported in the 'Dominion Expert Station Progress Report' on the basis of over 14 year of trials,

that deep ploughing was not necessary. Messrs Low and Nizamuddin in 'Agricultural Journal of India', and then Mr. Allen, in his 'Remarks on Primary Cultivation Under Indian Conditions', have shown the superiority of soil inversion by bullock ploughs in trials conducted over many years.

After establishing the superiority of bullock-drawn implements over the tractor ones under normal cultivation practice, Sri A.O.Khan along with Sri B.P.Mathur carried on some investigations with the object of obtaining experimental evidence on the moot question of the depth of cultivating as to whether there is any difference in the yields when tillage is carried out of the same depths with the bullock ploughs and the tractor discs. These experiments were conducted at the Indian Agricultural Research Institute, New Delhi for a period of two years (1950 and 1951).

Similar plots were taken. One of the plots was ploughed 9-10 inches deep with tractor soil inversion plough in the first instance and followed by normal cultivation with tractor implements to achieve a suitable seed bed for two crops, (1) Maize in kharif and (2) Wheat in Rabi. The Second plot was ploughed five inches deep with soil inverting plough drawn by bullocks followed by normal cultivation with the local country plough.

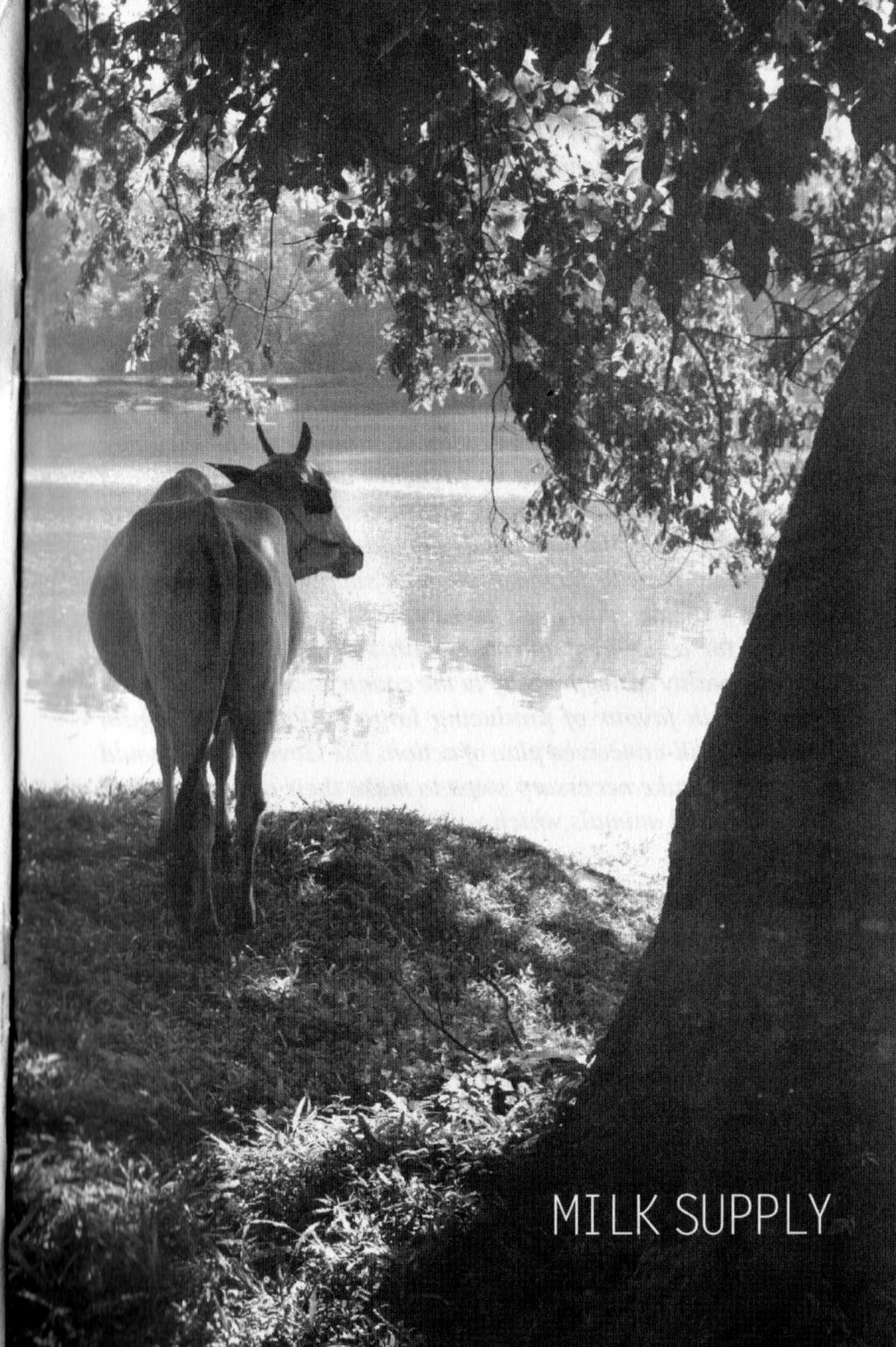
A third plot was ploughed upto 4-5 inches deep with the local country plough without inversion throughout the season and the fourth plot was ploughed by tractor discs to depth of about four inches. It was found that the deep ploughing with tractor gave an average yield of 37.44 maunds per acre of wheat while the shallow ploughing with tractor gave an average yield of 37.16 mds. per acre of wheat. The highest yield was 40.23 mds. per acre when only the country plough was used. The use of bullock soil inverting plough followed by local country plough gave a

yield of 39.97 mds. per acre. All the four plots were treated in the same way as regards manures and other things. Thus we note that the deep as well as shallow ploughing with tractor gives comparatively low yields while the highest yield is given by the country plough.

With the recent advances in soil science it is becoming increasingly clear that good physical condition of the soil is as important, if not more so, in regard to its chemical constitution. The structural pattern of the seed bed or tilth was the best under shallow cultivation with country plough in the above experiments. This rendered an easy flow of nutrition to the plants and that is the reason of higher yield of wheat obtained under this treatment. Shallow cultivation with tractor disc, however, did not produce the same effect due to great pulverisation of soil, making it fluffy and single grained, which is not conducive to good yields.

The inferences from the above experiments to be drawn are that the time-honoured implement-country plough-is still the best for ploughing. Mechanised cultivation with tractor permits speed in work and enable a larger area to be cropped in absence of man power, but does not ensure any bigger yield.

February, 1955. "Gram Udyog Patrika"



MILK SUPPLY

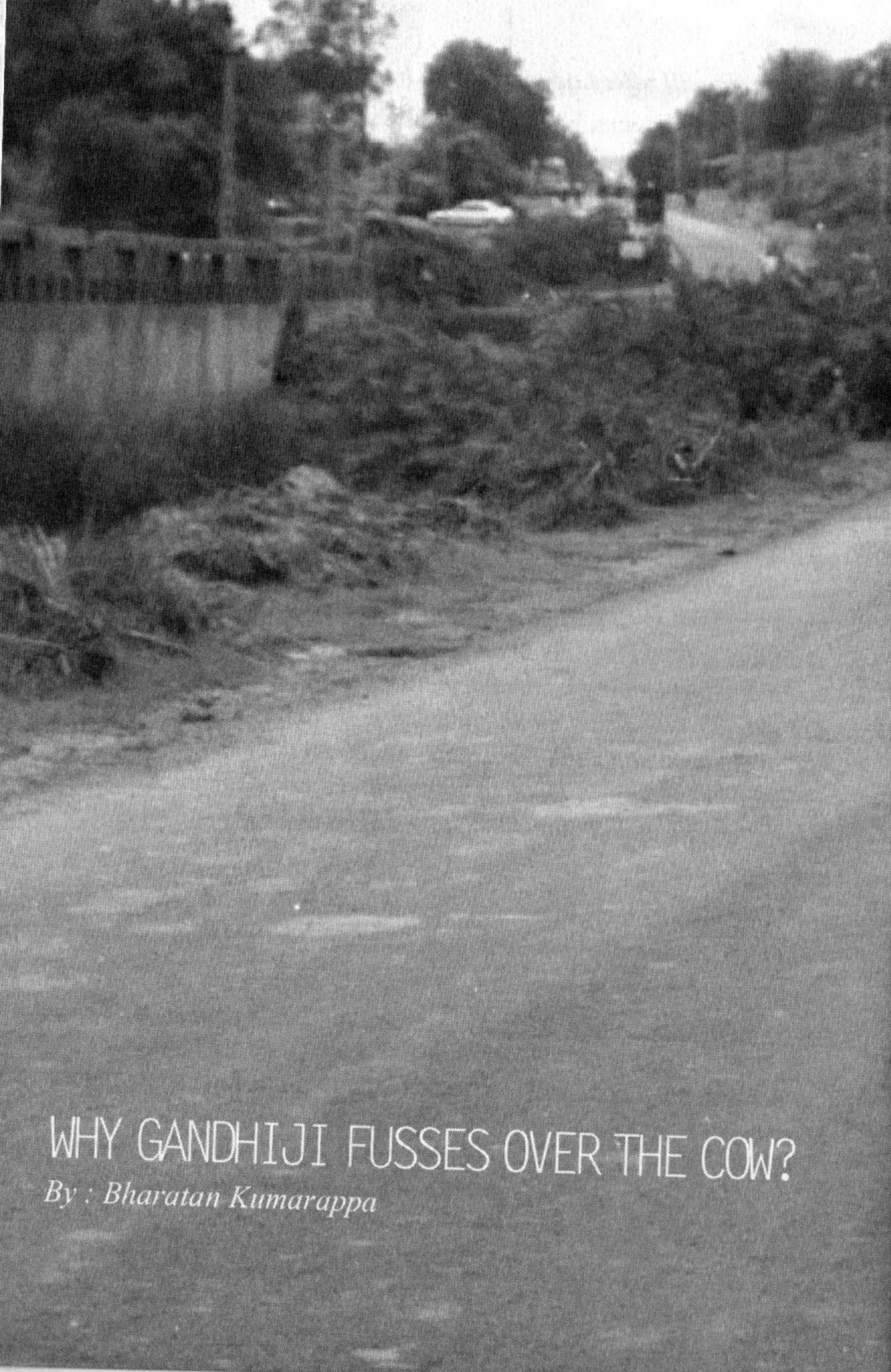
The supply of milk in our country has suffered greatly because of the war. Great many animals of good extraction have been slaughtered to supply the military needs and others still are being destroyed by one or other requirements of the military. We have, therefore, to increase the milk supply of the country. For this it is necessary to increase both the number of milk yielding animals as well as improve the breed of our cattle. Up to now, in many places, the Government has been developing the breed with a view to supplying the needs of the military. For this they have been breeding bull which would give large-sized bullocks for draught purposes. These large bullocks, however useful they may be to the military who count no cost, they are beyond the means of the millions of small farmers who cannot afford to feed these huge animals. The farmer needs compact and strong bullocks for his work. Now to increase the milk supply the Government has been providing stud bulls from cattle farms, which have been working for a different purpose, with the result that the milk yielding quality of the progeny in the countryside has been much decreased in favour of producing large bullocks. This again discloses an ill-conceived plan of action. The Government should immediately take necessary steps to make their cattle breeding farms to breed animals which will meet the requirements of the people.

Again the Milk Sub-Committee of the Policy Committee on Agriculture are recommending the establishment of milk collecting and processing centres and special cold storage and railway transport facilities. This may imply scouring the countryside for the benefit of the town. Many of the cities today depend on such milk, taken away from the mouths of children of the milk-producers. Any collection of milk must take care that the milk obtained is a definite surplus over and above the dietary needs of the producers and their families. Otherwise this

programme will affect adversely the health of the people in the country.

Plans and schemes got up haphazardly are likely to do more harm than good and our second state of affairs may be worse than the first.

January, 1947. "Gram Udyog Patrika"



WHY GANDHIJI FUSSES OVER THE COW?

By : Bharatan Kumarappa



Once Smt. Aruna Asaf Ali raised a question which no doubt evoked sympathy in the minds of many. It was as to why we should trouble ourselves about the cow, when we have enough problems to tackle relating to man. Gandhiji's brief reply was that if he bothered about the cow, it was because he saw that many problems relating to man in our country could not be solved except with reference to the cow. This answer deserve to be expanded and explained, if we are gain an understanding of the issue involve.

India is an agricultural country, with about 300 millions of its population depending on agriculture for their livelihood. For them the cow is more than their right hand, since without the aid of bullocks which the cow provides, ploughing, irrigating, weeding, harvesting, threshing, carting and marketing will be next to impossible. Bullocks are necessary for carrying on village industries like oil-pressing. At present these animals, which provide the motive power in agriculture and village industries, are weak, starved and diseased.

How can people in our villages become prosperous so long as they have to depend on such a feeble instrument for eking out a livelihood ? The bullock is the villager's machine. If a man is struggling with an inefficient machine which requires repairing and overhauling, who would say, "Why bother with the machine ? Help the man". The best way of helping him is to provide him with an efficient machine.

To this our city-educated youth may reply- "If the bullock is inefficient, scrap it, and use the tractor and other modern devices." The only difficulty about accepting this advice is that it is impracticable under present conditions. It is of no use telling us what should be done at some future date.

We have to face the problems of our people today, and suggest means of improving their condition under present circumstance and within the resources now available to them. Which villager can afford a tractor and other modern agricultural machinery ? The bulk of them can hardly obtain a meal a day. It is like asking a clerk earning Rs.25/- a month to go to his office in a Rolls Royce. Marvellous idea, only it is unworkable. But it may be thought that though the average cultivator in India cannot afford tractors, a Zamindar can, and the peasant can use the Zamindar's tractors. This, however, would mean, so far as the peasant goes, a condition ten times worse than at present, for at least now he is to a limited extent independent to till the soil as best as he can. But if he has to do away with his bullocks and use the Zamindar's tractor he can do so only by becoming even more dependent than at present on the Zamindar for his instruments of production, and this means for him a step nearer to slavery.

If, on the other hand, it is thought that peasants can pool their financial resources and by modern agricultural machinery co-operatively and use them co-operatively, then the difficulty is that today the co-operative movement is not being run by the villagers themselves, and the people have neither the capacity nor only in regard to the needed capital, but also in order to pool their land resources together, for their land is at present in tiny fragments, which are far too small for a tractor.

Modern agricultural machinery is useful where there are hundreds of acres to be cultivated at a stretch. The peasant has very often only one or two acres in his ownership or control. To pool all these fragments together and to work them co-operatively is beyond his powers today.

Even later, it may not be wise for him to adopt tractors and mechanical devices in agriculture. They are useful in countries

with a small population and vast areas to be cultivated. The situation in India is just the reverse. If we adopt machines to replace human beings in agriculture, where shall our people go for employment? As it is, large scale industries are not able to absorb more than about two million and people are therefore even more increasingly being driven to agriculture for a livelihood. But if agriculture also is mechanised, it too will not be able to provide work except for a few millions, and what is to happen to the rest of our 400 million people?

Besides, mechanization involves fuel, of which we have only a limited supply in our country.

Further, it is said that artificial manures like Chemicals, which we shall have to resort to, if in the place of bullocks we took to tractors and other machinery, are definitely injurious to the soil. They stimulate the soil and make it produce much for the time being, but only to leave it in the end exhausted and impoverished. They are also said to cause disease in crops and in animals.

This is the experience of Sir Albert Howard, formerly Economic Botanist to the Govt. of India. He is definitely of the opinion, elaborated in his book called *As Agricultural Testament* that the only manure which can permanently enrich the soil and help healthy growth in plants and animals is organic, i.e. the cattle dung and urine, human excreta, and waste vegetable matter. If this is so, then cattle will be required in agriculture, not only for labour but also for the valuable manure they provide.

For these reasons, then it would seem best for us not to be allured into following the way of mechanised agriculture but to fall back on the bullock for motive power. If we do so, the cow which provides the bullock must occupy a central place in our national economy.

Consider further, many of us, whether for religious other reasons, are vegetarians, and do not wish to be a party slaughter of animals for food. Being vegetarians, we require milk and milk products to supplement the deficiencies of an exclusively vegetarian diet. We must therefore have some animals which will provide us milk. What is better than the cow, the mother of the bullock which we need for our agriculture? If we look after it well, it will provide us milk for our sustenance and bullocks for doing our work.

Instead of this, the modern tendency in India is to depend on the buffalo for milk. But the he-buffalo is comparatively useless for work in the fields. So it is slaughtered. Similarly, since the cow is wanted only for the sake of its bullocks, it is sent off to the slaughter-house no sooner than it has calved, and the calf has been weaned, for it is too expensive to feed the cow till its next calving. Thus under this method both the buffalo and the cow are slaughtered.

This can be avoided if we maintain only the cow, and obtain both our milk and our bullock from it. To do this will also be cheaper from the national view point, for we shall then have to maintain only one animal for both the purposes instead of two as at present.

Further, the bullock which we want from the cow will be stronger and of a better quality, for the cow will be better looked after and fed when we depend on it for milk.

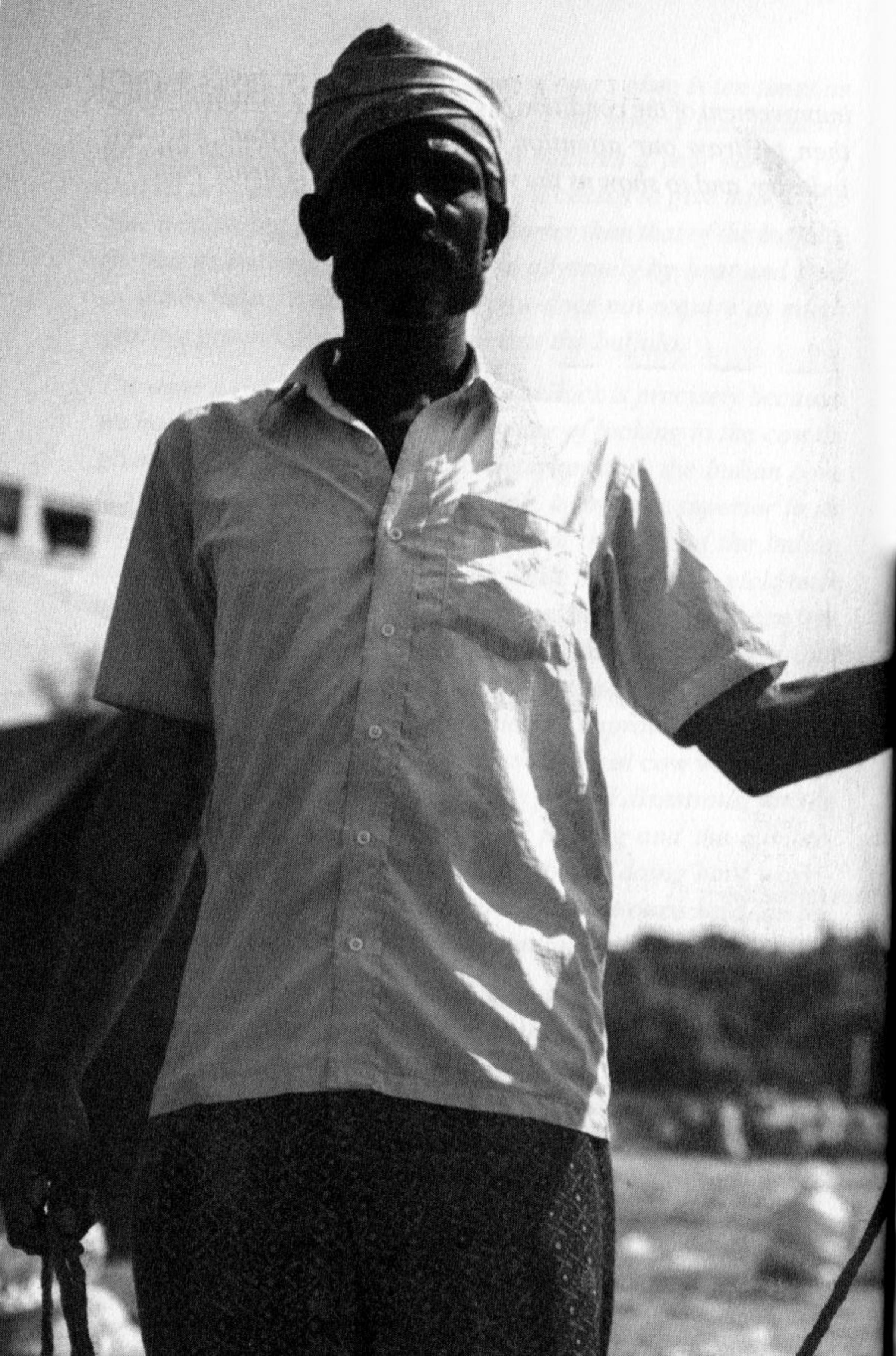
Other reasons which may be given in favour of the cow for supply of milk as against the buffalo are (a) that cow's milk is more conducive to health than buffalo's as it has more vitamin B, and has in addition vitamin E which is absent in buffalo milk, (b)

that the Carotene (vitamin A) value of cow's ghee is ten times as high as that of buffalo ghee, (c) that the cow is less liable to disease than the buffalo, (d) that it matures a year earlier, (e) that its dry period, i.e. from the time it ceases to give milk to the time it calves again, is three times shorter than that of the buffalo, (f) that its milk yield is not affected adversely by heat and cold as the buffalo's and (g) that the cow does not require as much grazing ground, feeding and water as the buffalo.

The deterioration in the cow and its bullock is precisely because we have departed from the old practice of looking to the cow as giver of plenty. Even with all its deterioration, the Indian cow, through centuries of careful breeding, is any day superior to its Western counterpart. The fat content of the milk of the Indian cow is rarely less than 4.5 per cent while British cows yield milk of 3.5 per cent fat content only. Besides, the Indian cow can live on meagre fodder locally available, can resist disease and withstand the tropical heat much better than the British cow. The solution therefore to the question of improving the present condition of our cattle is not to cross the local cow with foreign breeds which, as a matter of fact, has proved disastrous, for the mixed breeds cannot stand the poor feeding and the climate, nor can they provide us bullocks capable of doing hard work - but to restore the cow to the central place it once held, as the giver of milk and the mother of the bullock.

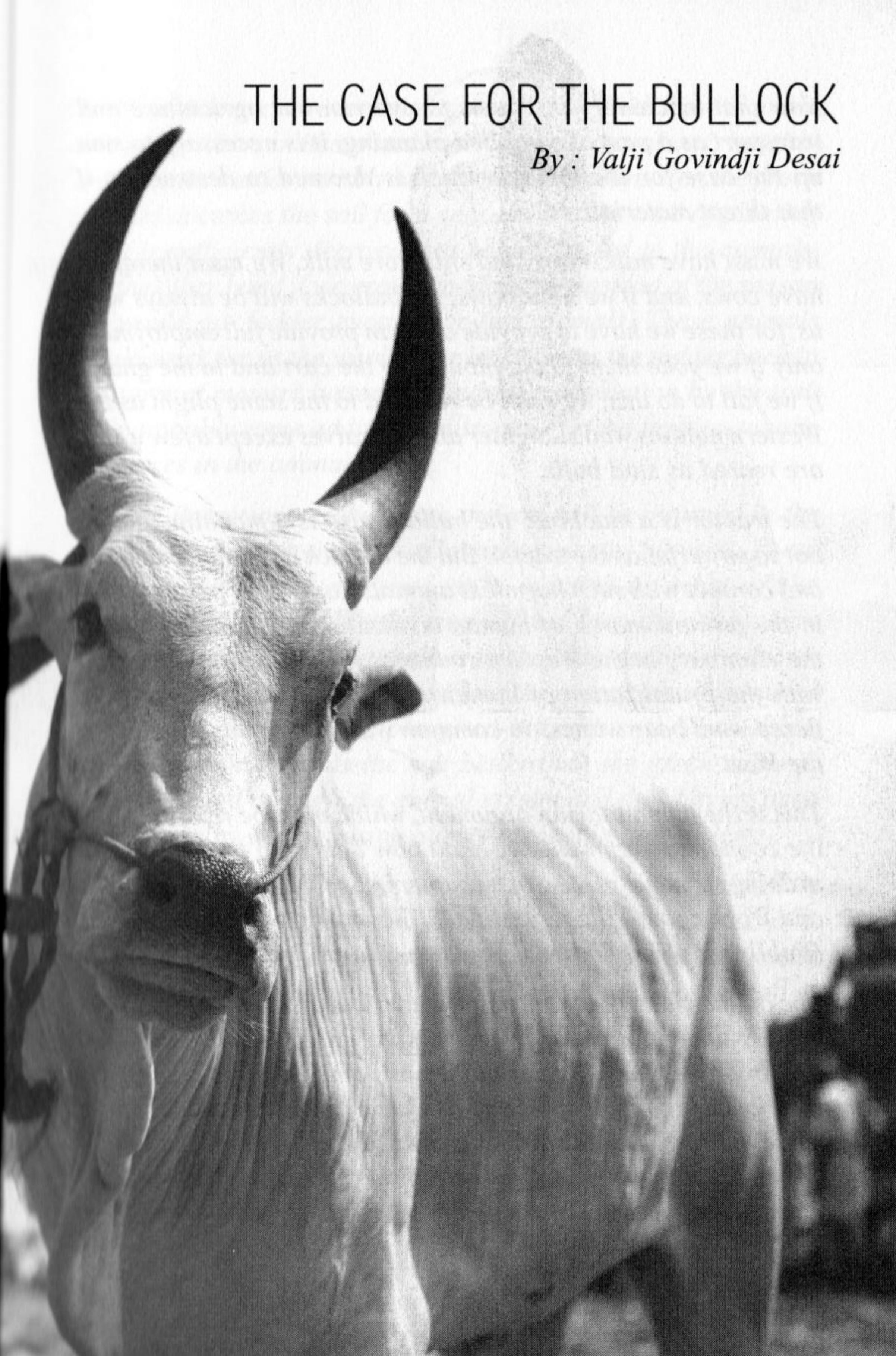
It is calculated that through its milk, bullocks, manure, hide and bone, the contribution of the cow to the wealth of India is over Rs. 1,000/- crores annually, an amount which no other industry in India except agriculture can be equal. Gandhiji has therefore established the Go Seva Sangh (association for looking after the cow) to devote its attention on a countrywide scale to the

improvement of the condition of cattle in India. Is Gandhiji wrong then to draw our attention to this most important national industry, and to show us the way to make it yield better results?



THE CASE FOR THE BULLOCK

By : Valji Govindji Desai



Now that machinery threatens to overrun our agriculture and transport as a part of so-called planning, it is necessary to sum up the case for the bullock which is doomed to destruction if that threat materialized.

We must have milk, more and still more milk. We must therefore have cows, and if we have cows, the bullocks will be always with us, for these we have to provide and can provide full employment only if we yoke them to the plough, to the cart and to the ghani. If we fail to do this, we shall be reduced to the same plight as the Western nations who slaughter all bull-calves except a few which are reared as stud bulls.

The tractor is a machine; the bullock also is a machine though not so powerful as the tractor. But the bullock is a living machine, and contact with such harmless animals has been a potent factor in the onward march of human civilization. I am not sure that the elimination in the Western countries has not something to do with the brutalization of human nature to which frequent and fierce wars bear witness in common with other evils peculiar to the West.

This is the humanitarian argument, which must be reinforced by the economic argument. We shall now deal with this latter, and in doing so make free use of a chapter in Shri N.G.Apte's *Thoughts and Work about Villages* entitled, "Economics of the Bullocks". (Publisher : Shri Sardesai Samarth Bharat Press, Poona -2).

The bullock is not only a living tractor; it is also a living fertilizer factory and gives us farmyard manure which supplies nitrogen and improves the porosity of the soil, thus helping to increase the moisture content of the soil as well as proper aeration. These three factors are essential to plant growth. 'No amount of concentrated manure would help if the porosity of the soil and consequent aeration of the soil are not improved'.

Artificial manures are an unmitigated curse. Then there is green manuring with sun hemp and other leguminous plants, but that too compares unfavourably with farmyard manure. For, the green manure occupies the soil for a season from the time of planting till it is sufficiently decayed, but cannot be fed to the animals. On the other hand if we grow a fodder crop instead of the season we would get fodder enough for two animals. These animals would work for us the whole year and give us the fodder back in the form of manure better adapted for assimilation by the soil, with probably some additional nitrogen derived from metabolic processes in the animal's body.

Most of the nitrogen taken from the soil will be returned in the dung as the bullock requires only carbohydrates for work. These carbohydrates are no good as a manure as most of the carbohydrate material in the crop is fixed from the atmosphere during the process of metabolism in the plant and is not drawn from the soil. Thus the bullock utilizes the energy which is wasted when a green manure is ploughed into the soil. Then again farmyard manure feeds the soil better than the green manure, having passed through the animal system and thus having been acted upon by decomposing agents present in that system.

The bullock's function as the manufacturer of a first class fertilizer is not the only point where it scores over the machine. For, no machine ever invented can perform the various duties that the bullock discharges. The bullock can work fast as well as slow. It cannot only be yoked to the plough, but also it can be used in crushing the ear heads as well as in carting the grain to the market. All this it does, while subsisting on the straw or the cake left after the grain and the oil have been utilized for human consumption. This oil too is extracted by the same animal. A pair of bullocks costs a few hundred rupees, but if it is supplanted

by machinery, the farmer must go in for an oil-engine, a motor truck, a tractor, small motor driven harrows and what not, which would cost him goodness knows how many times as much. Then again he must purchase fuel in the shape of oil, which cannot be produced on his own field or even in his own country.

The main agricultural operations of ploughing, harrowing, sowing and inter-culturing keep the bullocks busy for only three or four months in the year. During the rest of the year they can be and should be used for carrying goods as well as passengers, for crushing oilseeds and so on. The bullocks are capable of doing all this, while the specialized machinery would remain idle during the long dull season.

Extraction of oil by machinery is profitable on the face of it, but the profits reappear on the debit side of the cultivator's account, with nothing on the credit side to counterbalance the debit.

We shall close with a final quotation from Shri Apte's valuable study :

"Machinery may be introduced when the existing man and animal power is fully occupied. At present this power is not fully utilized, and therefore there is no occasion for the introduction of machinery."

14th April, 1946. "Harijan"



PASTEURISATION OF MILK
VS. BOILING

By : Om Prakash

There is a race going on at present in India to copy blindly all the methods and processes which are used in Western countries. Pasteurisation of milk is part of it. Time and again voices have been raised against this craze of mechanisation of the industries which affect a great many of our masses. A scientific study of the process of pasteurisation of milk has been made and it has been found that there are more viable bacteria left in the pasteurised milk than are found in the fresh sample in the milking pot due to the tropical climate of India.

In Western countries pasteurisation and immediate refrigeration is the legal standard of preliminary treatment of milk. The presence of bacteria in milk in large quantities is the cause of many diseases. Hence methods have been developed to check the growth of bacteria in milk and pasteurisation is one such. This practice is also adopted in the military and civil dairy farms in India. In all the big cities pasteurised milk is supplied by some Government and public agencies.

Drs. Rangappa and KT Acharya of Indian Institute of Science, Bangalore had studied this problem. They found that at the time of milking the number of bacteria per c.c. in the milking pot was 6,300. If left over for two hours after the milking, the number of bacteria becomes 2,25,000. If the milk is pasteurised within a period of 2 1/2 hours after milking, which is also a general practice in all the dairy farms, the number of bacteria per c.c. comes down to 9,400. In a well knit organisation the pasteurised milk is bottled within half an hour after pasteurisation. When after this period i.e. 3 hours after milking, the bottled milk was tested for its bacteria count, the number per c.c. was found to be 15,000. Pasteurised milk 18 hours after milking, was found to contain 1,21,000 bacteria per cubic centimetre. Hence, it is evident that in spite of the elaborate process of pasteurisation and subsequent cooling of milk, the number of bacteria is more

that in the fresh milk. Besides, the quick multiplication of these bacteria under ordinary conditions of preservation shorten the life of milk.

That this method of treatment and preservation in cold storage is not commendable to the Indian farmer, not only from the point of view of economy but also from its unsuitability under tropical conditions, has been emphasised by Write in his 'Report of marketing of Milk in India and Burma, 1943, P. 213' on the development of the Indian Dairy Industry. The expensive and the elaborate nature of the equipment are obvious drawbacks, while its sterilising efficiency is questionable.

In contrast to this method of processing the simple boiling is best suited for Indian rural conditions. Sri Srinivasan and Banerjee have investigated the bacterial destruction after pasteurising the milk and have compared it with the methods of steaming for one hour in an autoclave at atmospheric pressure and boiling. When a sample of raw milk containing 120,000 bacteria per c.c. is steamed for one hour the number of bacteria reduces to 100 per c.c., when a sample of raw milk containing 1,50,000 bacteria per c.c. is boiled for 5 and 10 minutes its bacteria count is reduced to 5,000 and 30 respectively and when it is boiled for such a time so that its volume is reduced to 23 in both the cases. When a sample of the milk boiled for 10 minutes is cooled and kept at room temperature for about 8 1/2 hours the number of bacteria is only 3200 per c.c.

Hence, the method of boiling milk for 10 minutes is evidently more efficient than pasteurisation. It has also been found that fresh milk so processed keeps for more than 24 hours at room temperature when cooled in a closed vessel and then stored. This method is perfectly suitable to Indian conditions where the farmer and the housewife have to store a small amount of milk. It needs no special equipment and demands but little skill.

Not only this, the quality of boiled milk is comparable to that of pasteurised milk though variations take place in the composition of milk, physical nature of its constituents and its digestibility when milk is pasteurised or boiled. Yet the protein, fat, lactose and mineral constituents remain practically the same in both the cases. While vitamin A of the milk is not destroyed by boiling, about 22% of vitamin C is lost at the first boil and 66% after 10 minutes of boiling. Exposure to light of the raw milk also causes the loss of vitamin C. Vitamin B1 (thiamine) and vitamin B2 (Riboflavin) are very little affected by this type of processing or preservation of milk. All the enzymes of milk, which alter the rate of chemical reactions, are all destroyed when milk is pasteurised or boiled. As regards the digestibility of milk it increases in the order raw, pasteurised and boiled.

Thus we see that our centuries old method of boiling the milk is not only safe, easy to handle but scientific too.

Cuckoo

This dream goes a long way back - a land covered with red soil, on the foothills of Jawadhu with overgrown plants is the place where 'Cuckoo' is situated.

We are so into our daily lives that we don't see beyond our society and into the depth of forests. Breaking away from the culture that society binds us into, filled with unconditional love, a sense of peacefulness will be this place called 'Cuckoo' on whose walls you will find the fingerprints of countless people.

This will be a place which will provide education to the children who lack opportunities as well as a place for the elderly who don't have a place to call their own. This will be a place where the young and old will walk hand in hand with the elders sharing and imparting things from the experience of their lives. A one without opposing nature and living in accordance with it; where the traditional and native methods of various things and aspects of life will be taught such as organic farming and etc.

To learn and to impart is what Cuckoo is all about. This land to us is a small cradle, from where our actual journey starts. These forests, these streams and such a place we hope will be the dream of every child born tomorrow.

A small story to portray as to how we see Cuckoo - There lives a pig that is pregnant and she weaves a bed for her little one to come; out of stones, thorn and roots. Cuckoo is similar to that bed which has been weaved out of so many materials that are considered discarded to nurture the many children of tomorrow.

Just like how a mushroom would grow under lighting, how a butterfly would fly away after getting its answers and how a flower would blossom from its inner soul is what cuckoo aspires to be for every child out there.

Quoting J.C. Kumarappa "Our objective is to organize the villages for a happier, more prosperous and fuller life in which the individual villager will have the opportunity to develop both as an individual and also as a unit of a well integrated society. This has to be initiated locally by using locally available resources to the utmost extent possible in the economic, political, and social fields, building these on cooperative lines. Self-reliance and organized life in the villages will thus be the aim of our planning. The various schemes of activity that are taken up locally should not merely be good for the locality but should also fit in harmoniously with the general plan. Such work will ultimately lead to the establishment of a just and democratic social order."

Thus J.C. Kumarappa talks about sustainable and natural living which is lost in today's world. The main idea and aim of 'Panai' is to rejuvenate this very objective of Kumarappa and to walk on these similar beliefs of his.